

We claim:

5

1. A golf ball including a composition comprising:  
an unsaturated polymer;  
a cross-linking agent;  
a peptizer; and  
an accelerator.
2. The golf ball according to claim 1, wherein the composition includes greater than about 0.1 part by weight of the peptizer per 100 parts by weight of the unsaturated polymer.
3. The golf ball according to claim 1, wherein the composition includes greater than about 0.5 part by weight of the peptizer per 100 parts by weight of the unsaturated polymer.
4. The golf ball according to claim 1, wherein the composition includes greater than about 2.5 parts by weight of the peptizer per 100 parts by weight of the unsaturated polymer.
5. The golf ball according to claim 1, wherein the peptizer is selected from the group consisting of pentachlorothiophenol, a metal salt of pentachlorothiophenol, a non-metal salt of pentachlorothiophenol, and dibenzamido diphenyldisulfide.
6. The golf ball according to claim 1, wherein the composition includes from about 0.1 part to about 10 parts by weight of the accelerator per 100 parts by weight of the unsaturated polymer.
7. The golf ball according to claim 1, wherein the composition includes from about 0.2 part to about 5 parts by weight of the accelerator per 100 parts by weight of the unsaturated polymer.
8. The golf ball according to claim 1, wherein the composition includes from about 0.5 part to about 1.5 parts by weight of the accelerator per 100 parts by weight of the unsaturated polymer.
9. The golf ball according to claim 1, wherein the accelerator is selected from the group consisting of 2-mercaptobenzothiazole and a salt of 2-mercaptobenzothiazole.

10. The golf ball according to claim 1, wherein the composition includes from about 0.05 part to about 5 parts by weight of the cross-linking agent per 100 parts by weight of the unsaturated polymer.

11. The golf ball according to claim 1, wherein the composition includes from about 0.2 part to about 3 parts by weight of the cross-linking agent per 100 parts by weight of the unsaturated polymer.

12. The golf ball according to claim 1, wherein the composition includes from about 0.5 part to about 1.5 parts by weight of the cross-linking agent per 100 parts by weight of the unsaturated polymer.

13. The golf ball according to claim 1, wherein the unsaturated polymer is selected from the group consisting of 1,2-polybutadiene, cis-1,4-polybutadiene, trans-1,4-polybutadiene, cis-polyisoprene, trans-polyisoprene, polychloroprene, polybutylene, styrene-butadiene rubber, block copolymer of styrene and butadiene, block copolymer of styrene and  
5 isoprene, nitrile rubber, silicone rubber, polyurethane, and mixtures thereof.

14. The golf ball according to claim 1, wherein the composition further comprises an ingredient selected from the group consisting of UV stabilizers, photo stabilizers, antioxidants, colorants, dispersants, mold releasing agents, processing aids, and fillers.

15. The golf ball according to claim 14, wherein the ingredient is a filler that adjusts a density of the composition.

16. The golf ball according to claim 14, wherein the ingredient is a filler selected from the group consisting of zinc oxide, tungsten, and barium sulfate.

17. The golf ball according to claim 14, wherein the ingredient is a filler and the composition includes from about 10 parts to about 80 parts by weight of the filler per 100 parts by weight of the unsaturated polymer.

18. The golf ball according to claim 1, wherein the composition further comprises a compound selected from the group consisting of an unsaturated carboxylic acid, a metal salt of the unsaturated carboxylic acid, and mixtures thereof.

19. The golf ball according to claim 18, wherein the composition includes from about 20 parts to about 60 parts by weight of the compound per 100 parts by weight of the unsaturated polymer.

20. The golf ball according to claim 1, further comprising:  
a core; and  
a cover layer over the core;  
wherein at least one of the core and the cover layer includes the composition.

21. The golf ball according to claim 20, wherein the core includes:  
an inner core; and  
an outer core encasing the inner core.

22. The golf ball according to claim 20, wherein the core includes a material in liquid form.

23. The golf ball according to claim 20, further comprising a layer of rubber thread located between the core and the cover layer.

24. The golf ball according to claim 1, further comprising:  
a core;  
at least one intermediate layer over the core; and  
a cover layer over the outermost intermediate layer;  
wherein at least one of the core, the at least one intermediate layer, and the cover layer includes the composition.

25. A golf ball including a composition comprising:  
an unsaturated polymer;  
a cross-linking agent;  
a peptizer; and  
an accelerator;

wherein the composition includes:

from about 0.2 part to about 3 parts by weight of the cross-linking agent per 100 parts by weight of the unsaturated polymer,

greater than about 0.5 part by weight of the peptizer per 100 parts by weight of the unsaturated polymer, and

from about 0.2 part to about 5 parts by weight of the accelerator per 100 parts by weight of the unsaturated polymer.

26. The golf ball according to claim 25, wherein the composition includes greater than about 2.5 parts by weight of the peptizer per 100 parts by weight of the unsaturated polymer.

27. The golf ball according to claim 25, wherein the peptizer is selected from the group consisting of pentachlorothiophenol, a metal salt of pentachlorothiophenol, a non-metal salt of pentachlorothiophenol, and dibenzamido diphenyldisulfide.

28. The golf ball according to claim 25, wherein the accelerator is selected from the group consisting of 2-mercaptobenzothiazole and a salt of 2-mercaptobenzothiazole.

29. The golf ball according to claim 25, wherein the unsaturated polymer is selected from the group consisting of 1,2-polybutadiene, cis-1,4-polybutadiene, trans-1,4-polybutadiene, cis-polyisoprene, trans-polyisoprene, polychloroprene, polybutylene, styrene-butadiene rubber, block copolymer of styrene and butadiene, block copolymer of styrene and isoprene, nitrile rubber, silicone rubber, polyurethane, and mixtures thereof.

30. The golf ball according to claim 25, wherein the composition further comprises an ingredient selected from the group consisting of UV stabilizers, photo stabilizers, antioxidants, colorants, dispersants, mold releasing agents, processing aids, and fillers.

31. The golf ball according to claim 30, wherein the ingredient is a filler that adjusts a density of the composition.

32. The golf ball according to claim 30, wherein the ingredient is a filler selected from the group consisting of zinc oxide, tungsten, and barium sulfate.

33. The golf ball according to claim 30, wherein the ingredient is a filler and the composition includes from about 10 parts to about 80 parts by weight of the filler per 100 parts by weight of the unsaturated polymer.

34. The golf ball according to claim 25, wherein composition further comprises a compound selected from the group consisting of an unsaturated carboxylic acid, a metal salt of the unsaturated carboxylic acid, and mixtures thereof.

35. The golf ball according to claim 34, wherein the composition includes from about 20 parts to about 60 parts by weight of the compound per 100 parts by weight of the unsaturated polymer.

36. The golf ball according to claim 25, further comprising:  
a core; and  
a cover layer over the core;  
wherein at least one of the core or cover layer includes the composition.

37. The golf ball according to claim 36, wherein the core includes:  
an inner core; and  
an outer core encasing the inner core.

38. The golf ball according to claim 36, wherein the core includes a material in liquid form.

39. The golf ball according to claim 36, further comprising a layer of rubber thread located between the core and the cover layer.

5           40. The golf ball according to claim 25, further comprising:  
a core;  
at least one intermediate layer over the core; and  
a cover layer over the outermost intermediate layer;  
wherein at least one of the core, the at least one intermediate layer, and the cover layer includes the composition.

41. A method for manufacturing a golf ball, the method comprising:

providing:

5

an unsaturated polymer,  
a cross-linking agent,  
a peptizer, and  
an accelerator;

preparing a composition from the unsaturated polymer, the cross-linking agent,  
the peptizer, and the accelerator; and  
forming the composition into the golf ball.

42. The method according to claim 41, further comprising compression molding  
the composition to induce cross-linking of the unsaturated polymer.

43. The method according to claim 41, further comprising applying thermal  
energy to the composition to induce cross-linking.

44. The method according to claim 41, wherein the composition is formed into  
half shells.

45. The method according to claim 44, further comprising compression molding  
the half shells.

46. The method according to claim 41, wherein the step of preparing the  
composition includes dry-blending the composition using equipment selected from the group  
consisting of a tumble mixer, a V-blender, a ribbon blender, and a two-roll mill.

47. The method according to claim 41, wherein the step of preparing the  
composition includes mixing the composition using equipment selected from the group  
consisting of a mill, an internal mixer, an extruder, and combinations thereof.